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tween the diffracting edge and the observer's eye" (Signal service, professional paper, xv. p. 41).

So explicit a description as this from a well-practised observer confirms the testimony of European specialists in sky colors, and leaves no question whatever that Bishop's ring did not then encircle the sun. And yet, in the summer of 1884, it was so strongly colored as to attract attention from the guides in the Alps, and to call for special description from more scientific mountain climbers. It was generally visible on clear days in the winter of 1884-85, and on many favorable occasions through the following summer. During this winter, it has seemed to me to be generally less distinct than a year ago; but the most brilliant display that I ever recorded was shortly after noon on the 2d of last November, when the sun was hidden by a rather heavy sheet of cirro-stratus cloud, while the western sky was clear. The glaring and brassy central area was then enclosed by a ring of strong reddish-gold color, fifteen to twenty degrees from the sun; next came the delicate rosy or purplish pink, and at last the ordinary blue of the sky. The colors were wonderfully vivid.

Many if not most observers of the ring attribute it to diffraction on particles of some sort derived from the eruption of Krakatoa; and, while this hypothesis has much to recommend it, it cannot be denied that the continued visibility of the ring puts a severe strain on it. It is not to be wondered at that the cosmic origin of the colors has its advocates, and hence a method of determining the altitude at which the diffracting particles float is of especial value.

Dr. Zenker of Berlin has a pertinent article on the question in a recent number of the *Meteorologische zeitschrift* (Berlin, ii. 1885, 400-406), in which he discusses the effect that the altitude of the diffracting layer of dust will have on the visibility of the ring during total solar eclipses. And as a total solar eclipse, visible in South America and on the Lesser Antilles, will occur about half-past seven in the morning of the 29th of next August, we would request especial attention to this matter from astronomers who may go down to observe it. Dr. Zenker gives directions for observations on or near the central line of the moon's shadow, and shows how they may lead to the desired determination: for it is evident, that, if the diffracting dust were all within a few miles of the earth's surface, the colors of the ring would fade away in a few seconds after the disappearance of the sun; while, if the dust lie far outside of the atmosphere, some portion of the ring might remain visible during the whole eclipse. This question will deserve a share of the watchfulness generally given to the solar corona and infra-mercurial planets.

W. M. D.

A trap-door spider at work.

A trap door spider, *Cteniza Californica*, which came from California in September, was put in a box with earth, and soon made a nest with a perfect door. She was found one morning occupying a hole three-quarters of an inch in diameter and deep enough to completely hide her, around which the ground had been cleared and smoothed, so that it was somewhat lower than the general level. Unfortunately, as this part of the work was done during the night, she accomplished it unobserved. She probably cleared the ground, however, as she had done on a former occasion, when she was seen to

walk slowly sideways, with all the feet on one side held together, turning slightly at the same time, and sweeping all rubbish and coarser bits of earth before her. In digging the hole, she threw the earth to a distance, as was shown by numerous little irregular lumps of earth scattered over some moss at the farther side of the box. Later the spider was seen to dispose of more in the same manner, but it was done so quickly that the exact motion could not be distinguished.

During the day she busied herself in the burrow, apparently treading against the sides, in order to make a compact wall. At night she rested, and nothing more was done until the following evening, when she commenced to build a straight ridge or rim of earth at one side of the hole. She brought up as much earth as could be carried under the mandibles, and placed it on top of this rim. When it had been secured by several strokes of the fangs, the spider turned, and rubbed the spinnerets over the spot, and afterwards all along the edge. The spinnerets were applied directly to the surface, and were used not only to produce the silk, but also to smooth and model the edge.

This process was repeated until the rim was about a quarter of an inch in height, when the spider left it, and commenced a similar one on the opposite edge of the hole. Here she worked, as before, until she had made a ridge about half as high as the other, when she returned to the first, and during the next hour added to them both alternately. At the end of that time, she brought up the first load of earth which was not used in building, and deposited it as far away as she could reach, without leaving the burrow. As she withdrew, she turned, and attached a line of web to the edge of the second rim, by which it was pulled over the opening after she had disappeared from sight. Henceforth it was necessary to lift and turn back this rim (or flap, as it might now be called, to distinguish it from the true door) whenever she came up, unless, as sometimes happened, she had neglected to pull it down.

In the mean time, the first rim, which was to become the true door, had been gradually enlarged; but another hour elapsed before any attempt was made to pull it down. The spider then fastened a line to the upper edge, by which, after a long and steady pull from below, the structure was dragged over the opening, which it only half covered. It was immediately raised, and carefully re-adjusted in an upright position. After another half-hour, devoted to adding more earth to the two rims alternately, the first was again drawn down; but, being still too small, it was once more returned to the old position, and the work of enlargement continued. As nothing but persistence in this course seemed necessary to complete the door, the spider was allowed to work the rest of the night without supervision.

In the morning the spider had vanished. The entrance of the nest was closed, and the depression around it filled, so that its position was perfectly concealed. Naturally, it was supposed that the door was finished; but the next night proved this conclusion to be erroneous. When the spider was visited at three A.M., the door covered only three-quarters of the opening, and she was still employed in adding earth to the edge. During the day the entrance had evidently been closed by the true door and the flap, used together as a double or folding door, one side being much larger than the other. The flap, no longer

needed as a cover, was now turned back and pushed away, the opening thereby being considerably enlarged. More earth was subsequently placed over and around it, until it was completely hidden, and rendered useless. Before morning the true door had attained the necessary size, and the lining had been added to it; but the lining of the burrow was not entirely completed until some days later.

A piece cut from this door showed it to be a layer of earth with a single lining; while an old nest which came with the spider, and which she presumably made, was provided with a door having nine linings, each of the eight lower ones enclosing a rim of earth, by which the door had been enlarged.

MARY T. PALMER.

The destruction of birds.

In view of what has already been said regarding the manifold ways in which our wild birds are being effectually diminished, something more should be added in reference to a practice which has long prevailed in the southern tier of states, including Maryland. I refer to the systematic shooting of thousands of song-birds in spring and fall to satisfy a market demand. In the city of Baltimore alone the destruction of robins forms a periodic business of no little profit or extent. A visit to any of the large markets at the seasons specified, where they are a constant feature of the game-stalls, will verify this statement. Rice-birds (bobolinks, as we know them farther north), golden-winged woodpeckers, red-winged starlings, and cedar-birds (the last chiefly in winter) share a like fate.

Our complaint is directed against the destruction, for purposes of food, of one and all these species, but especially the robin. It may be legitimate to destroy the rice-bird and starling at the time and place of their devastation, but this does not sanction their slaughter in districts where rice does not grow, and the species are beneficial to crops. If practical ornithologists are not wholly in the wrong, it is neither wise nor legitimate to destroy the robin under any circumstances. The robin nests familiarly in and about gardens and orchards in large numbers when unmolested, rearing two and sometimes three broods, of four or five young each, in the season; and although he makes raids oftentimes into the strawberries, cherries, and other small fruits, it is a cheap toll for the incalculable services which he has previously rendered. Instead, however, of being protected by laws generally prevalent, they are but partially protected during their breeding-season in the north, to be killed on the spring and fall migrations.

Notwithstanding the great productiveness of a species, its numbers must be very materially diminished by the thousands, and probably tens of thousands, annually shot down for the market. It should also be remembered that the destruction of these birds in spring is particularly fatal, since with each pair thus killed we kill the possible young of the same year.

The human and brute enemies of the birds have been amply alluded to, but I have seen no reference to the trade in skins and eggs which has rapidly grown up in the past few years. In obscure corners of most cities of considerable size, persons may be found who deal in birds' skins and eggs, old coins, postage-stamps, and various other specialties, conducting a largely juvenile trade through the post. Their bulletins are now sown broadcast, especially among the boys' boarding-schools of the country.

They offer tempting exchanges, premiums in eggs to the largest buyer, and give the price of eggs singly or in 'sets.' In most cases there is no identification, no date or locality given, so that the scientific value is usually lost. With such educating influences as these, how can we expect the thoughtless small boy, and better class of older boys at schools, to regard egg-nesting as any thing more than harmless employment, to be carried on as extensively as that of stamp-collecting, only with much less method? In framing laws to protect the birds, would it not be well to prohibit the sale of their eggs and skins for all such amateur and pseudo-scientific purposes?

Furthermore, with all these human and brute enemies with which our native birds have to contend, what possible excuse can be found for adding a still more deadly and effectual agent, — the business-like slaughter of useful species for food? If, indeed, the game-market was understocked, other birds might be had which are not to be commended as highly for either song or utility.

People who encourage this kind of traffic, in respect to the robin at least, are either thoughtlessly or willfully robbing our lawns and orchards of one of its heartiest and most cheerful songsters, and agriculture of an indispensable friend and ally. F. H. H.

Baltimore, March 1.

In a recent number of the *Indianapolis Times* there appeared an article on bird destruction, containing the following extracts given by a well-known taxidermist of that city. They will not only serve as additional evidence of the destruction of birds for personal adornment, but also bring into notice, in this regard, a portion of our country which has not yet been mentioned, and will give the evidence of one who should be posted concerning that which he tells.

"It is a very inexpensive and simple thing to mount birds for millinery purposes, and the number who can engage in it is so large that no county in the state is free from the ornithological murderer. If the present rate of destruction is continued, which is equivalent to saying that if the fashion in millinery does not change, the state will be depopulated of its birds in five years. I have lately spent whole days in the woods without seeing a bird, except the unspeakable sparrow. Last year there were shipped from this city 5,000 bird-skins collected from the Ohio valley, chiefly from Indiana. Now, suppose that half of these birds were females: they would lay, on an average, five eggs each in a season, — a total of 12,500 eggs. Of these, 10,000 probably would hatch. Added to the 5,000 birds killed, here is represented a yearly destruction of 15,000 birds, — a sacrifice to fashion.

"It is important to note that this represents only the slaughter of the fashionable birds. Styles change. A year ago blackbirds for women's hats were in great demand, and thousands of them were killed. Now there is no market for blackbirds. Each of the 5,000 birds sent out of the state during the year 1885 was in style; that is, was either a jay, yellow-hammer, cedar-bird, or an owl. These birds are shot and skinned, and the skins allowed to dry before shipment. One man to whom I sent birds this week shipped 75,000 skins of American birds to France, and each year he duplicates this shipment. But the most of the American birds are sold at home. They are sent to the Long Island factories, where the skins